CALIFORNIA ACADEMY OF SCIENCES

FY18 ANNUAL REPORT

July 1, 2017–June 30, 2018

Letter from the Interim Executive Director and Chair of the Board of Trustees

September 27, 2018

This year marks a major milestone, celebrating our first ten years of redefining what it means to be a 21st century science museum—inside our award-winning green building and in the world beyond. Thank you for you being part of our community of supporters: **Friends of the Academy**, **Platinum Circle**, **Eastwood Associates**, and **Corporate and Foundation Partners**.

Last year, the Academy connected 1.3 million visitors to the wonders of the natural world and the power of science. We shared cutting-edge research and discoveries—debuting an award-winning planetarium show, ***Expedition Reef***, and a major new exhibit, ***Giants of Land and Sea***. We grew ***Academy for All*** programs to keep the museum accessible and affordable, especially for children and families. And we unveiled plans to dramatically expand our free school field trips program, thanks to an **endowment gift** from Arthur and Toni Rembe Rock.

The Academy also reached new audiences. For example, our **NightLife** events for visitors 21 and up featured a Women in Science night sponsored by our **Institute for Biodiversity Science and Sustainability**, as well as **500 Queer Scientists**, a visibility campaign for LGBTQ+ science professionals launched by Academy scientists. We hosted 2,100 teenagers for **Teen Science Night**, and nearly 100 percent reported they had a blast. And our online publication, ***bioGraphic***, inspired millions of people globally with solutions-based science and nature stories—garnering prestigious **journalism awards**.

The Academy continues to seek partnerships to reveal and implement sustainable solutions for a healthier world. Last year, we made breakthroughs in coral reef biology, conservation, and restoration through ***Hope for Reefs***; carried out an unprecedented **biodiversity survey** to protect a 130-million-year-old Malaysian rainforest; and joined forces with National Geographic Society to grow our **iNaturalist** app—building a global citizen science movement that is fueling scientific discovery.

Please find our **fiscal year 2018 Financial Statements** and **Annual Report** enclosed. Thanks to **Academy Leadership and Trustee** guidance, we are proud to report a balanced budget and less than five percent endowment draw. Your contributions directly support our daily operations and major initiatives—and the scientists, educators, and science communicators featured in this report. We hope you enjoy reading their stories and learning about the world-changing work that your partnership makes possible. Thank you!

Sincerely,

Mike McGee
Interim Executive Director
Chief Financial Officer

Elizabeth R. Patterson
Chair of the Board of Trustees

HOPE FOR REEFS **Sustainability Science in Action**

How do Academy scientists help protect Earth's coral reefs for future generations?

They tackle the challenge from every angle.

Growing up in Ohio, **Dr. Rebecca Albright** dreamed of exploring oceans. Today, she is a global expert on coral reproduction, researching corals' ability to recover from the devastating impacts of climate change, overfishing, and habitat destruction. Rebecca is spearheading cutting-edge research in the Academy's new **Coral Spawning Laboratory**—only the second of its kind in the world. In this controlled environment, she is able to manipulate light and temperature to simulate spawning conditions and better understand how to help corals reproduce more successfully in the wild, where spawning events are incredibly rare. In an exciting initial success, spawning occurred just months after the lab began operating.

Rebecca's research is an important aspect of our ***Hope for Reefs*** global initiative, which leverages world-renowned scientists, outstanding public engagement, and pioneering work with advanced genomics and technical deep diving. Her work in the laboratory aims to advance efforts already underway in the Caribbean to restore damaged reefs. Through a powerful partnership between the Academy, SECORE International, and The Nature Conservancy, along with local stakeholders, we are spearheading breakthrough techniques in reproductive biology to rear larvae of ecologically-important coral species. These corals are then "seeded" directly back onto damaged reefs to support genetic diversity and give reefs a chance to recover and thrive.

To share the wonders of coral reefs and the urgent need to protect them, *Hope for Reefs* scientists collaborated with our world-class Visualization Studio to create ***Expedition Reef***,

Previous page photo: Rich Ross

the Academy's newest award-winning planetarium show. Both a technological feat and a storytelling marvel, this full-dome, all-digital immersive experience transports audiences to an underwater world teeming with vibrant life. Viewers see how corals feed, grow, and reproduce; learn what scientists are doing to restore reef ecosystems; and discover how we can all help.

Hope for Reefs scientists also shared groundbreaking research in global media outlets and publications. ***Nature*** and ***Wired*** featured Dr. Albright's pioneering research on ocean acidification and coral reproduction; **Dr. Luiz Rocha** and post-doc Dr. Hudson Pinheiro published about the evolution of marine life around islands in ***Nature***; and ***Smithsonian Magazine*** featured our deep reef expeditions. These explorations of previously-unreachable ocean depths have inspired cutting-edge advances in dive suit technology, and an Academy-invented **decompression chamber** to safely transport fish species for study and display in our award-winning ***Twilight Zone: Deep Reefs Revealed*** exhibit.

Our goal as scientists right now is to understand how these systems are likely to respond in the coming decades, and to preserve as much as we possibly can. Coral reefs are unbelievably resilient ecosystems if we give them a chance. We need to make responsible choices—particularly with respect to carbon emissions—that will ease the pressure on these ecosystems and help give them the best possible chance to recover.

– Dr. Rebecca Albright
Hope for Reefs co-lead

PENANG HILL **Mapping a Rainforest**

What happens when 117 researchers and scientists converge on a 130-million-year-old rainforest?

They find new species and create an unprecedented catalog of forest life to protect the rainforest for future generations.

Last October, **Dr. Meg Lowman** realized an ambitious vision—bringing together an interdisciplinary team of Academy scientists, working with local and international colleagues, to document biodiversity in Malaysia's Penang Hill tropical rainforest. Just miles from a major metropolis, yet virtually unexplored, Penang Hill was a remarkable site for a floor-to-canopy survey during an exciting 11-day **BioBlitz**.

Our very own "Canopy Meg" pioneered the science of canopy ecology and knows that more than half of any forest's biodiversity lives in the canopy. Meg and colleagues carefully climbed rare and endangered tree species to document the orchids, ferns, and epiphytes (air plants) thriving at such heights. Researchers set up motion-sensitive cameras and documented 59 mammals, including macaques, dusky-leaf monkeys, tree rats, and flying squirrels. Explorers tallied new regional sightings: birds, bats, orchids, mammals,

Previous page photo: Anthony Ambrose

flies, ants, mosquitoes, spiders, and frogs never known to occur in Penang. In a surprise nighttime collection, Academy arachnologist **Dr. Lauren Esposito** and post-doc Dr. Stephanie Loria spotted a new species of scorpion from one of Earth's oldest lineages, known as ghost scorpions.

The BioBlitz generated worldwide buzz, with field updates broadcast in real-time to classrooms around the world and coverage by dozens of international media outlets, including the Academy's own ***bioGraphic***. Users of the **iNaturalist** app, powered by the Academy and National Geographic Society, logged more than 1,400 species observations. In just two weeks, this far-reaching survey amassed a wealth of information about Penang Hill's unique inhabitants, and bolstered the rainforest's nomination as a United Nations Educational, Scientific, and Cultural Organization (UNESCO) protected biosphere reserve for generations to come.

Penang's forest is special because it stands protected in a region of the world facing rapid deforestation. It's also important as a pristine rainforest located so close to a major metropolis. Yet prior to this survey, which included the often forgotten canopy, we knew very little about what lived there.

– Dr. Meg Lowman
Lindsay Chair of Botany

Photo: Anthony Ambrose

THE ROCK PROGRAM **Life-Changing Science Education**

How do we ensure that every elementary school child in San Francisco can visit the Academy for free and forever?

We partner with visionary philanthropists who understand the power of education to transform young lives.

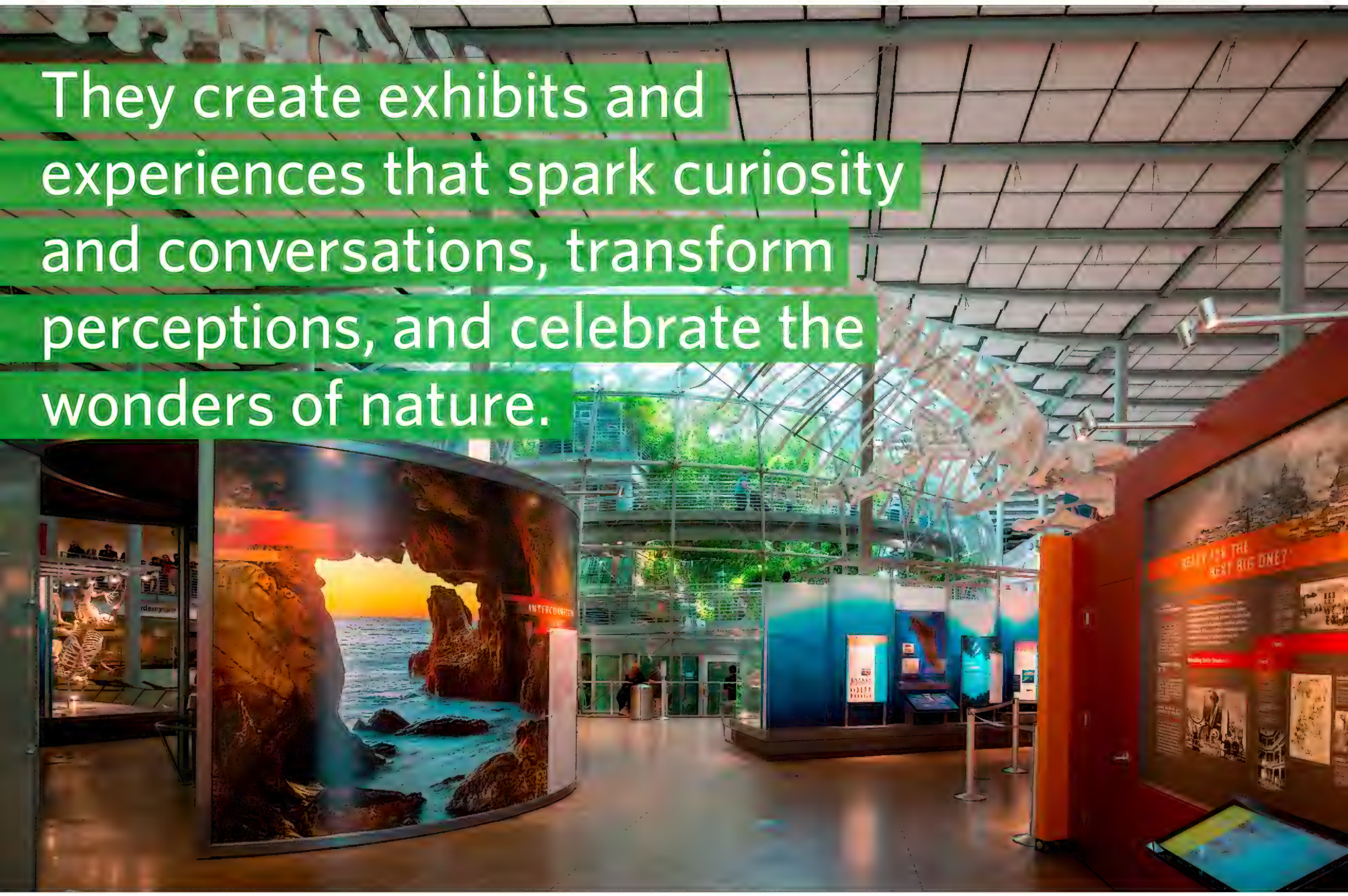
When long-time Academy education enthusiasts Arthur and Toni Rembe Rock proposed a $9 million endowment to dramatically expand the popular free field trips program they endowed in 2008, we were overjoyed. There was just one catch; we had to raise matching funds to earn their gift.

Of course, we jumped at the opportunity. Since 2008, **Rock Program free field trips** have provided every San Francisco student in 4th and 5th grades with access to all the Academy has to offer—planetarium shows, rainforest adventures, a vast underwater world, and much more. The program also covers enrichment essentials like science lessons led by Academy educators; take-home materials in multiple languages; teacher workshops; Rock Family Nights; field trips in Cantonese, Mandarin, and Spanish to serve diverse language learners; and free transportation.

We immediately engaged our community of dedicated partners, who helped us raise the matching funds by midnight on December 31st. Thanks to everyone who generously contributed, and to the Rocks above all, we are thrilled that the expanded endowment will **grow the Rock Program** so that all San Francisco students in kindergarten through 5th grade can visit the Academy—every year!

Youth programming at the Academy also includes **Careers in Science**, **Teen Advocates for Science Communication**, and **Teen Science Night**. These programs provide thousands of young people with access to transformative science learning and discovery experiences—revealing a world of possibilities. Beyond Academy walls, our far-reaching ***Environmental Literacy Initiative*** (ELI) provides educators and students with high-quality online science education content—translated into 21 languages and viewed more than 4 million times across every U.S. state and country in the world! From nationwide **Science Action Clubs** (serving more than 18,000 middle school youth) to robust multi-media online resources, we are proud to help grow a curious, engaged, science-literate next generation.

What do the Academy's world-class scientists, exhibit designers, and science educators all have in common?


They create exhibits and experiences that spark curiosity and conversations, transform perceptions, and celebrate the wonders of nature.

The new California-focused ***Giants of Land and Sea*** exhibit was a perfect Academy-wide collaboration. And it revealed the tenacity of our Exhibit Studio team, who spent nearly two years searching for a massive slice from a giant coast redwood tree to display.

With the Exhibits team simultaneously wrestling with the complex details of building an immersive fog room to show how fog nourishes coastal redwoods; re-imagining our popular Shake House for visitors to experience the rumbles and jolts of the 1906 and 1989 Bay Area earthquakes; and preparing to install more than a dozen articulated marine mammal specimens from Academy collections, Exhibits Registrar Lindsay Palaima spearheaded the quest for a redwood round. Immediately, she faced a challenge: Fortunately, ancient redwoods are protected on state-owned land, but that makes it extremely difficult to find a fallen tree and secure permits to collect a piece of one.

In April 2017, with exhibit design well underway, the Exhibits team got a lead. An 800-year-old redwood had fallen in Prairie Creek Redwoods State Park. The site was difficult to access with heavy equipment, and transporting an approximately 8,500-pound, 9-foot-diameter cross-section would be an epic endeavor. But the Academy team persevered. With help along the way from partners at California State Parks, Save the Redwoods

League, and Humboldt State University, a portion of the tree was finally extracted, air-lifted by helicopter out of the wilderness, trucked to the Bay Area, dried and prepared for display, and ultimately wheeled onto our museum floor. The effort was well worth it when *Giants of Land and Sea* opened in June. Visitors of all ages stood awe-struck before the ancient redwood, gazing at its rings to "read" the story of more than 800 years of environmental history revealed by one exceptional organism.

Giants of Land and Sea also tells riveting stories about our human connections to coastal food webs. Beautiful cinematography features the Yurok Tribe—at the forefront of managing redwood forest habitat and rivers that support threatened salmon runs. Visitors learn about citizen scientists helping scientists understand the impact of changing ocean ecology by documenting nature with **iNaturalist**, powered by the Academy and National Geographic Society. And an immersive redwood theater reveals breathtaking views from a redwood tree canopy.

With California's iconic ecosystems facing dramatic impacts from environmental changes, *Giants of Land and Sea* provides an opportunity for the Academy to shine a light on the extraordinary biological diversity in our own backyard—and to share conservation partnerships and sustainability solutions with the public. We expect more than 6 million visitors—including 1 million school children—to visit the exhibit over five years, and are proudly presenting content in four languages (English, Chinese, Filipino, and Spanish) to engage our diverse community of visitors in helping to protect California's treasured giants for future generations.

We have a whole section that focuses on citizen science and the app iNaturalist. That data is actually used to help determine how systems are changing and how animals are moving and migrating because of climate change.

– Scott Moran
Senior Director of
Exhibits and Architecture

AFRICAN PENGUINS **Species Survival Plan**

What's more fun than a colony of 14 playful penguins?

Two new penguin chicks, that's what!

Rudo and Rufaro mean "love" and "happiness" in the African Shona language. Every hatch represents a conservation success for the endangered African penguin species.

– **Brenda Melton**
Associate Director
of Steinhart Aquarium

Earlier this year, we celebrated the **births of Rudo and Rufaro**, two African penguin brothers hatched at the Academy. Under the care of Brenda Melton, Associate Director of Steinhart Aquarium, and fellow biologists, the chicks bonded behind-the-scenes—learning to swim and eat fish before joining the rest of the colony on exhibit in African Hall.

But the chicks' earliest days were not all smooth sailing; their biological parents were unable to care for them properly during the vulnerable first weeks of life. Academy biologists responded quickly, fostering each chick to a pair of "foster birds." Thanks to their foster parents, Rudo and Rufaro are thriving—proving that it takes a village to raise a penguin chick.

Rudo and Rufaro are part of a **Species Survival Plan** to maintain genetic diversity in our resident population of African penguins—a species at high risk of extinction in the wild. To augment their breeding program work, Academy biologists regularly travel to South Africa to hand-rear chicks abandoned by their parents and introduce them back into the wild. In 2017, we partnered with the Association of Zoos and Aquarium's Invest in the Nest project to place more than 1,500 artificial nests in South Africa. Academy visitors can spot these nest box prototypes on the Academy's **Living Roof**, where scientists monitor temperature and humidity levels within the boxes to ensure that endangered penguins in the wild will have comfortable homes.

CITIZEN SCIENCE **Advancing Science, Connecting Communities**

How can people use smartphones to help scientists solve 21st century environmental challenges?

By documenting the natural world, one image at a time.

The Academy is building our capacity to monitor the changing fabric of life on Earth using "big data" drawn from crowd-sourced observations, our invaluable museum collections, and advanced satellite and global observation networks.

Through a new partnership between the Academy and National Geographic Society, our **iNaturalist** app uses smart technology to change the way people see nature and help protect it. With 14 million unique global observations, and growing daily, iNaturalist underscores the power and potential of citizen science to assist scientific research and engage millions of environmental stewards worldwide. Users simply upload photos to iNaturalist's database—now capable of recognizing 24,000 species and getting smarter every day—and receive real-time feedback from a community of nature-lovers and professional scientists.

City Nature Challenge, organized by Citizen Scientist teams at the Academy and the Natural History Museum of Los Angeles, utilizes iNaturalist as a tool to get people outside to explore and document their local environment. Launched three years ago as a friendly rivalry between the Bay Area and Los Angeles, the event has flourished. Citizen scientist groups in nearly 70 cities around the globe competed in this year's challenge, providing a valuable snapshot of urban biodiversity.

Having tallied more than 400,000 submissions from across five contents, next year's goal is even more ambitious: Engage citizen scientists on every continent on Earth. In a note of local pride in this year's highly-competitive arena, the San Francisco Bay Area **swept all three City Nature Challenge categories**. The most observed species? The California Poppy, of course!

Top left photo: University of Padova, Top right photo: WWF Hong Kong, Bottom left photo: The Nature Conservancy

THANK YOU

Thank you for joining our thriving community of visionary supporters and partners. We look forward to another year of world-changing scientific exploration and discovery with you!